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ABSTRACT

This booklet is intended to help mainstreamed mentally retarded, emotionally disturbed, or learning disabled high school students acquire a basic understanding of the responsibilities and working conditions of tractor-trailer drivers and to practice basic math skills necessary in the occupation. The first section provides a brief introduction to the occupation by focusing upon those job tasks of a tractor-trailer driver with which the student is likely to be familiar. The next two sections deal with the work environment of the typical tractor-trailer driver and the training, education, and experience needed for the occupation. Exercises addressing basic math skills used by tractor-trailer drivers are provided. Various suggestions are listed for students interested in further exploring the occupation of tractor-trailer driver. A glossary and answer sheet conclude the booklet. (KC)

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MATH on the job

Tractor-Trailer Driver

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MATH ON THE JOB:

TRACTOR-TRAILER DRIVER

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MATH on the job

Tractor-Trailer Driver

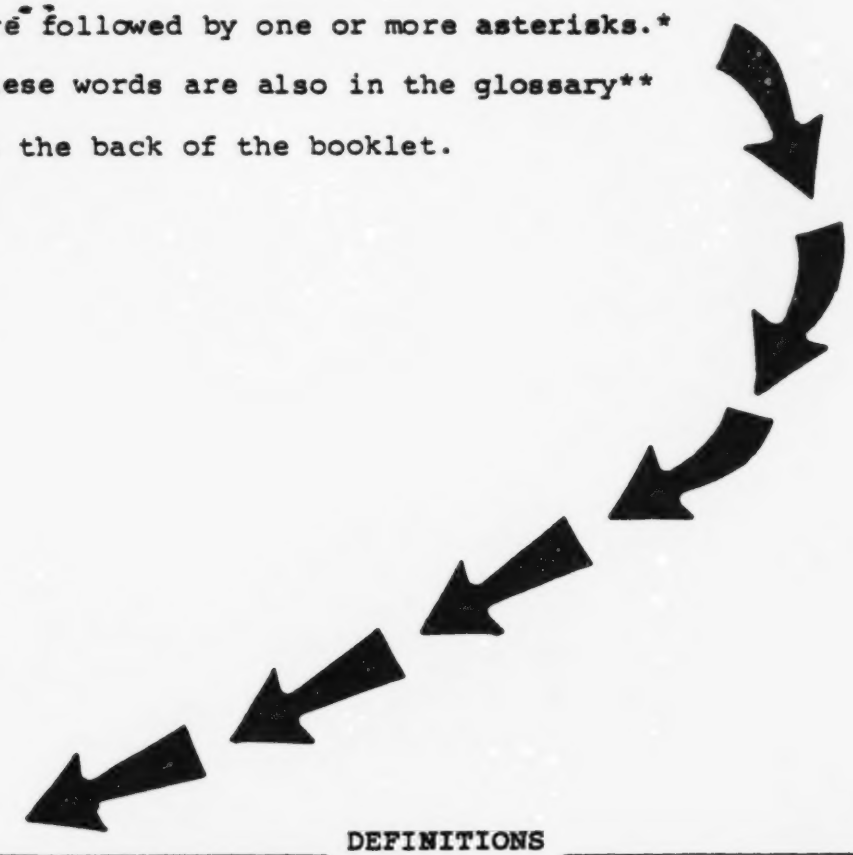
In this booklet, you can--

- find out what a tractor-trailer driver does
- see how a tractor-trailer driver uses math
- get a chance to use math as a tractor-trailer driver
- find out the types of things a tractor-trailer driver needs to know
- find out what courses, training, and experience you need to become a tractor-trailer driver

SPECIAL WORDS USED IN THIS BOOKLET

Workers in many jobs use special words or special meanings for words. Learning these words helps you to learn about a job.

You will find some of these special words in this booklet. When these words, and some hard words, are used for the first time, they are followed by one or more asterisks.* These words are also in the glossary** at the back of the booklet.



DEFINITIONS

*An asterisk (*) is a symbol that tells you to look at the bottom of the page for the meaning, or definition, of the word.

**A glossary is a list of words with their meanings.

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HAVE YOU EVER...

- gone on a long trip by yourself?
- watched a truck driver back a semi-truck into a loading dock?
- talked on or listened to a C.B. radio?
- watched a moving van driver load or unload furniture?
- used a road map to plan a long trip?

If you have, then you have some idea about the work of a tractor-trailer driver. This booklet will help you to learn more about the work of a tractor-trailer driver and how math is important to do the job.

WHAT DOES A TRACTOR-TRAILER DRIVER DO?

The tractor-trailer driver's main task is to deliver manufactured products, raw materials, or animals to places more than 100 miles from the truck terminal. How does a tractor-trailer driver do this? The driver--

- receives assignments from a **dispatcher***
- gets the delivery forms
- plans the **delivery route****
- checks the condition of the truck to make sure it is safe to drive
- makes sure the cargo has been loaded properly
- drives the tractor-trailer to the delivery place
- unloads the goods and packages for the customer
- asks the customer to sign a receipt
- keeps records of the day's activities
- prepares reports about the trip and the condition of the truck

DEFINITIONS

*A **dispatcher** is the person who decides each day what deliveries will be made and who will make them.

A **delivery route is the roads a tractor-trailer driver takes to make all the stops or deliveries.

Math is very important to the work of a tractor-trailer driver. The driver needs to know how to--

- read and write whole numbers, decimals, and fractions
- add, subtract, multiply, and divide
- read gauges such as fuel, oil pressure, air pressure, and engine temperature
- read and interpret maps and charts
- **estimate*** weight and volume
- estimate time and distance
- keep records showing such things as driving time, total work time, rest time, and time spent loading and unloading the truck
- estimate load weights to make sure the load does not exceed weight limits
- estimate volume to make sure loads are loaded correctly
- plan and select the route to take in order to reach the destination
- plan trips so that the driver arrives at the correct time

DEFINITION

*To <u>estimate</u> is to guess carefully.

A tractor-trailer driver uses math to measure miles driven.

EXAMPLE

In your truck you will have an instrument for measuring the miles traveled. This instrument is called an odometer. It measures miles to the nearest tenth of a mile. To measure the miles traveled, you must read the odometer both at the start and the end of a trip.

Let's assume that your are driving a load of computer parts from Boston to Los Angeles. At the start of your trip your odometer reads 59,647.3. At the end of your trip your odometer reads 62,620.0. How many miles have you traveled?

To find the answer, subtract the beginning odometer reading from the ending odometer reading.

62,620.0 - 59,647.3 = 2,972.7

You have traveled 2,972.7 miles.

NOW YOU TRY IT

Practice Exercise A

How many miles did each tractor-trailer driver travel?

	Beginning Odometer Reading	Ending Odometer Reading	Miles Traveled
1.	74,893.3	75,261.6	?
2.	29,461.4	32,890.2	?
3.	94,626.7	95,891.1	?
4.	64,893.5	66,451.1	?
5.	58,392.8	60,111.9	?

A tractor-trailer driver uses math to schedule driving time.

EXAMPLE

The U.S. Department of Transportation, Federal Highway Administration requires that all long-distance drivers spend 10 hours or less a day driving. After 10 hours of driving time, drivers must take 8 hours off duty. Actual driving time cannot be more than 70 hours in an 8-day period.

Let's assume you are driving a load of furniture from New York to Los Angeles, a distance of 2,970 miles. If you drive at an average speed of 55 miles per hour, how many hours of driving time do you need to schedule for your trip? Since you can only drive 10 hours in a 24-hour period, how many days will you need to schedule for your trip?

To figure out how many hours of driving time you need, divide the total number of miles by the average speed.

$$2{,}970 \div 55 = 54 \text{ hours}$$

To figure out how many days you need, divide the hours of driving time by the number of driving hours in a day.

$$54 \div 10 = 5.4 \text{ or } 5 \text{ days, } 4 \text{ hours}$$

You will need to schedule at least 5 days, 4 hours for your trip.

NOW YOU TRY IT

Practice Exercise B

Copy and complete the table below.

	Distance In Miles	Average Speed	Driving Hours	Driving Days
6.	1,265	55	?	?
7.	600	50	?	?
8.	825	55	?	?
9.	2,475	50	?	?
10.	5,250	52.5	?	?

A tractor-trailer driver uses math to figure out how much fuel will be used on a trip.

EXAMPLE

The use of fuel is measured in terms of miles per gallon. This means that for each gallon of gasoline or diesel fuel, the tractor-trailer driver can drive a certain number of miles. Most fuel tanks hold many gallons of fuel.

How many gallons of fuel would a tractor-trailer use to travel 500 miles if the truck gets 8 miles per gallon? To find the answer, divide the total number of miles traveled by the number of miles per gallon.

$$500 \div 8 = 62.5 \text{ gallons}$$

NOW YOU TRY IT

Practice Exercise C

How many gallons of fuel would each tractor-trailer use? Round the answer to the nearest hundredth of a gallon.

	Miles traveled	Miles Per Gallon	Gallons Needed
11.	625	7	?
12.	934	8	?
13.	1,263	8.5	?
14.	795	7.3	?
15.	841	6.2	?

A tractor-trailer driver uses math to estimate weight.

EXAMPLE

Each state sets maximum weight limits for tractor-trailers. A driver caught driving an overweight truck can receive a large fine. A tractor-trailer driver can avoid a fine by keeping track of the truck's gross weight.

To calculate the gross weight, the driver adds the weight of the truck and the goods in the truck. Let's assume that the maximum weight limit is 80,000 pounds and that the truck weighs 38,000 pounds. Assume that the truck is carrying 250 boxes and each box weighs 200 pounds. Is the gross weight of this truck legal?

Step 1. Calculate the total weight of the goods.

250 boxes x 200 pounds = 50,000 pounds

Step 2. Add the weight of the truck to the total weight of the goods. The answer is the gross weight.

50,000 + 38,000 = 88,000 gross weight

Step 3. Compare the calculated weight to the maximum weight allowed. If the gross weight you calculated is less than the maximum allowed, then the load is legal. If the gross weight you calculated is more than the maximum allowed, then the load is not legal.

Since 88,000 is more than the maximum gross weight, the load is not legal.

NOW YOU TRY IT

Practice Exercise D

Is the gross weight of each truck legal?

	Maximum Gross Weight	Weight Of Truck	Number Of Boxes	Weight of Each Box	Legal or Not Legal
16.	80,000	38,000	150	250	?
17.	85,000	35,000	200	200	?
18.	75,000	40,000	400	90	?
19.	92,000	42,000	350	150	?
20.	80,250	37,500	215	195	?

WHERE DOES A TRACTOR-TRAILER DRIVER WORK?

A tractor-trailer driver can work for several different types of businesses. The driver may--

- work for a private carrier such as a chain food store or manufacturing plant. Private carriers transport their own goods.
- work for a for-hire carrier such as a trucking company or moving company. For-hire carriers transport goods owned by others.
- own the truck and rent the truck to a trucking company.

A tractor-trailer driver may work with many different people, such as--

- dispatchers who give the assignments
- material handlers or dock workers who load and unload the truck
- mechanics who repair the truck
- other tractor-trailer drivers who work for the same company

A tractor-trailer driver may have a truck driver's helper to help with the work. The helper helps load and unload the goods at the customer's place. Sometimes, the helper may drive the truck in order to learn how to be a good driver.

A tractor-trailer driver also works with customers and should be friendly and polite to them. The driver should listen to their complaints and try to help them solve problems. The driver should report any complaints or problems to the supervisor.

A tractor-trailer driver uses special equipment. The driver may use--

- a hand truck* to move large or bulky items
- a dolly** to move heavy objects
- ropes or straps to tie large objects against the side of the truck. This keeps the items from falling or moving around when turning a corner or making a sudden stop.
- emergency flares to put outside the truck if it breaks down.
- mechanic's tools to make minor repairs to the truck.

DEFINITIONS

*A <u>hand truck</u> is a metal frame that has handles at one end and wheels at the other. A metal edge is slid under a heavy load and the load is tilted off the ground. The load can then be wheeled to a different place.

**A <u>dolly</u> is a small platform on wheels. The load is put on the top of the platform and can be wheeled to a different place.

The delivery trip of a tractor-trailer driver may vary. The driver may make a regular trip or could make a different trip every day. The driver may pick up a loaded truck early in the morning and drive to a nearby city. Or the driver may go on a trip that will take several days and visit several cities.

As a tractor-trailer driver, you may specialize in the type of material or products you have. You may be a--

- tank truck driver and deliver gasoline, fuel oil, or liquified petroleum gas to customers.
- transport driver and deliver new cars and trucks to dealers.
- double-bottom driver and drive a tractor with two trailers hitched to it.
- long-haul-sleeper driver and work as a member of a two-person team and sleep in a bunk behind the driver's seat.

IF YOU ARE INTERESTED

IN THE WORK OF A TRACTOR-TRAILER DRIVER

AND WOULD LIKE TO KNOW MORE,

READ ON

WHAT TRAINING, EDUCATION, AND EXPERIENCE DO YOU NEED TO BECOME A TRACTOR-TRAILER DRIVER?

A tractor-trailer driver needs to know many things. A driver needs to know how to--

- read and write in English
- drive a truck
- use a map
- make minor repairs to a truck
- move heavy or bulky objects without getting hurt and without hurting other people or the product
- obey traffic laws and avoid accidents
- be nice to customers

To get a job as a tractor-trailer driver, you must meet certain minimum requirements that have been established by the U.S. Department of Transportation. You must--

- be at least 21 years of age
- be able to pass a physical examination which requires good hearing, 20/40 vision with or without glasses, normal use of arms and legs, and normal blood pressure
- take and pass a driving test
- take and pass a written test on Motor Carrier Safety Regulations
- have a valid **chauffeur's license***

DEFINITION

*A <u>chauffeur's license</u> is a special driving permit for persons employed to drive motor vehicles.

You also may have to meet additional requirements established by the company you wish to work for or by the state that issues your driver's license.

While you are waiting to meet the age requirement, you can prepare yourself for a job as a tractor-trailer driver by--

- taking courses in high school such as drivers training, auto mechanics, math, English, and general business
- working part time at a truck stop servicing tractor-trailers
- working on the loading dock at a **motor freight company***
- attending truck driving school at a technical school or a community college
- working as a truck driver's helper by traveling along and loading or unloading the truck

These experiences will give you valuable training that will assist you in getting a good job as a tractor-trailer driver.

DEFINITION

*A motor freight company is a business that transports goods or material by truck.

DO YOU WANT TO DO MORE TRACTOR-TRAILER DRIVER'S MATH?

Practice Exercise E

How many miles did each tractor-trailer travel?

	Beginning Odometer Reading	Ending Odometer Reading	Miles Traveled
21.	81,624.1	83,920.7	?
22.	16,943.5	20,000.3	?
23.	32,112.6	35,899.2	?
24.	47,933.2	48,499.7	?
25.	79,832.6	82,663.1	?

Practice Exercise F

Copy and complete the table below.

	Distance in miles	Average Speed	Driving Hours	Driving Days
26.	850	50	?	?
27.	1,100	55	?	?
28.	735	52.5	?	?
29.	1,540	55	?	?
30.	2,205	52.5	?	?

Practice Exercise G

How many gallons of fuel would each tractor-trailer use? Round the answer to the nearest hundredth of a gallon.

	Miles traveled	Miles per Gallon	Gallons Needed
31.	881	8	?
32.	1,034	9	?
33.	912	8.5	?
34.	624	7.8	?
35.	1,492	6.4	?

Practice Exercise H

Is the gross weight of each truck legal?

	Maximum Gross Weight Allowed	Weight Of Truck	Number Of Boxes	Weight of Each Box	Legal or Not Legal
36.	92,000	38,000	740	75	?
37.	85,000	37,500	430	110	?
38.	80,000	40,000	300	125	?
39.	75,000	35,000	415	97	?
40.	80,250	42,000	600	64	?

DO YOU WANT TO EXPLORE SOME MORE?

1. Contact your state's motor vehicle department. Ask about the requirements to get a chauffeur's license. Find out how old you have to be. Find out what tests you have to take. Find out where and when the tests are given.

2. Plan a short trip using a road map. Figure out what roads you will take. Figure out how many miles you will travel. Figure out how long it will take you to get there.

3. Go to a place of business that employs tractor-trailer drivers. Talk to several drivers. Ask them what their jobs are like. Ask them what they like and don't like about their jobs.

4. Look in the help wanted section of your newspaper. See if you can find any ads for tractor-trailer drivers. Find out what experience you need. Find out how much the jobs pay.

5. Are you interested in other jobs in the trucking industry?

   - A **material handler** loads the truck so the driver can make deliveries. The material handler arranges the items on the truck in the order they will be delivered.

   - A **truck driver's helper** helps load and unload the truck at the customer's location. Sometimes, the helper drives the truck.

   - A **dock worker** loads and unloads freight at a loading dock. An experienced dock worker can advance to a tractor-trailer driver's job.

   - A **local truck driver** usually drives a light truck or van on short trips.

   While you can do these jobs without all the math skills listed in this booklet, you can do your work better if you do have math skills. You also may get a chance to move up to a better job if you can do your work well. Part of doing your work well is doing the math needed on the job.

GLOSSARY

Asterisk (*): a symbol that tells you to look at the bottom of the page for the meaning or definition of the words.

Chauffeur's license: a special driving permit for persons employed to drive motor vehicles.

Delivery route: the roads a tractor-trailer driver takes to make all the stops or deliveries.

Dispatcher: a person who decides each day what deliveries will be made and who will make the deliveries.

Dolly: a small platform on wheels. The load is put on top of the platform and can be wheeled to a different place.

Estimate: to guess carefully.

Glossary: a list of words with their meaning.

Hand truck: a metal frame that has handles at one end and wheels at the other. A metal edge is slid under a heavy load and the load is tiled off the ground. The load can then be wheeled to a different place.

Motor freight company: a business that transports goods or materials by truck.

ANSWER SHEET

Practice Exercise A

1. 368.3
2. 3,428.8
3. 1,264.4
4. 1,557.6
5. 1,719.1

Practice Exercise B

6. 23; 2 days & 3 hrs.
7. 12; 1 day & 2 hrs.
8. 15; 1 day & 5 hrs.
9. 49 1/2; 4 days & 9 1/2 hrs.
10. 100; 10 days

Practice Exercise C

11. 89.29
12. 116.75
13. 148.59
14. 108.90
15. 135.65

Practice Exercise D

16. legal
17. legal
18. not legal
19. not legal
20. legal

Practice Exercise E

21. 2,296.6
22. 3,056.8
23. 3,786.6
24. 566.5
25. 2,830.5

Practice Exercise F

26. 17; 1 day & 7 hrs.
27. 20; 2 days
28. 14; 1 day & 4 hrs.
29. 28; 2 days & 8 hrs.
30. 42; 4 days & 2 hrs.

Practice Exercise G

31. 110.13
32. 114.89
33. 107.29
34. 80.00
35. 233.13

Practice Exercise H

36. not legal
37. legal
38. legal
39. not legal
40. not legal